

NORTHWEST FISHERIES SCIENCE CENTER
WEST COAST GROUND FISH OBSERVER PROGRAM
DATA REPORT AND SUMMARY ANALYSES

January 2004

Introduction

Goal of this Report

This report is an update of the report released in January 2003 by the West Coast Groundfish Observer Program (WCGOP), which summarized the first year of data collection. The WCGOP collects at-sea data onboard the west groundfish fleet (excluding the at-sea and shoreside whiting fleet¹). The WCGOP's goal is to collect information on the discard of west coast groundfish to be used in assessing the total fishing mortality of a variety of groundfish species. This report includes trawl data collected during the first two years of the program (Sept 2001-Aug 2003).

The West Coast Groundfish Fishery

The groundfish fishery off the west coast of the United States operates from the Canadian to the Mexican border. Multiple vessel types participate in this fishery. Vessels delivering to shoreside processors range in size from 8' kayaks to 120' trawlers. They fish in both nearshore and offshore waters. The vessels use various types of gear including bottom trawls, midwater trawls, pots, longlines and other hook and line gear to catch over 80 species. Trawlers take the majority of groundfish. The catch can be very diverse. Fish size and overall volume of catch can vary widely. In many cases, a portion of the catch is retained, while another portion is discarded at sea. The catch may be discarded at sea because it is unmarketable or is in excess of management limits.

Active management of the fishery began in the early 1980's with the establishment of Optimal Yields (OYs) for several managed species and trip limits for widow rockfish, the Sebastes complex, and sablefish. The objective of trip limits has been to slow the pace of landings to maintain year-round fishing, processing, and marketing opportunities. Since the 1980's, management regulations generally have evolved to the use of cumulative 2-month landing limits.

¹ The at-sea Pacific whiting fleet is monitored by another section of the WCGOP. The shoreside Pacific whiting fleet retains all catch and that catch is monitored by state port samplers.

Fisheries managers use state-issued sales receipts (fish tickets) and vessel logbooks to monitor landings. Fish ticket and vessel logbook data are transferred to the Pacific Fisheries Information Network (PacFIN) by state fisheries agencies in Washington, Oregon and California. The fish tickets are useful in tracking the pace of the fishery throughout the year. Trip limit amounts may be changed throughout the year based on this information. In order to comply with annual OYs, managers also need information on the discard of each species. One of the best means of acquiring accurate data needed to estimate the amount of discarded catch is through an at-sea observer program.

Methods

West Coast Groundfish Observer Program

On May 24, 2001, NOAA Fisheries (NMFS) established the WCGOP to implement the Pacific Coast Groundfish Fishery Management Plan (50 CFR Part 660). This regulation requires all vessels that participate in the groundfish fishery to carry an observer when notified to do so by NMFS or its designated agent. The observer program's goal is to improve estimates of total catch and discard. The program deploys as many as 40 observers, depending on seasonal variation in fishing activity. These observers are stationed along the coast from Bellingham, WA to San Diego, CA.

Program Goals

During the first year of coverage, the sampling goal for the WCGOP was to provide observation of 10% of the coast wide limited entry trawl landings of groundfish species other than whiting (as reported in fish tickets). An additional goal was to provide pilot observer coverage in the limited entry fixed gear sablefish and rockfish fisheries (The observer coverage plan is available at: www.nwfsc.noaa.gov/fram/observer). During the second year of coverage, the program's goal was to increase trawl coverage and expand coverage of the limited entry fixed gear sablefish and open access fisheries targeting rockfish.

Vessel Selection Process

The WCGOP aggregates ports along the west coast into "port groups". Limited entry trawl permits in each port group are randomized and sequentially selected for observation for an entire two-month cumulative trip limit period. This selection process is designed to produce a reasonably proportional distribution of observations along the coast. Based on this design, the program has

cycled through all limited entry trawlers during each year of the program. However, due to the recent buyback program², the program expects to cycle through the fleet more frequently in the future.

The program also selects limited entry fixed gear permits and state permits in the open access fleets. The sablefish endorsed limited entry fixed gear permits are selected for coverage during the entire primary sablefish season to ensure that the total quota fished on each selected permit is observed. The program expects to complete the coverage of all the sablefish endorsed limited entry fixed gear permits by the end of 2004. The data for this coverage will be summarized in another report.

Similar to the trawlers, non-sablefish endorsed limited entry permits and state licenses in the open access fleets are randomly selected for a two-month cumulative trip limit period.

The program expects to complete the coverage of all non-sablefish endorsed limited entry fixed gear permits by the end of 2004.

Coverage of open-access vessels targeting groundfish has been hampered by the availability of contact information for this fleet and the logistical challenges of placing observers on small boats. In addition, state agencies needed time to amend their regulations to allow WCGOP observers on vessels operating in state waters. A report on coverage of these fleets is anticipated during 2005.

General Data Collections

The fisheries observers are trained professionals who monitor and record catch data on commercial fishing vessels, following the protocols in the WCGOP Manual (NMFS, NWFSC, 2003, unpublished report). The data collected by the observers include:

- Start time, end time and location of tow/set
- Gear type and fishing strategy
- Estimated total catch weight (including tows/sets for which there is 100% discard)
- Weight of discard by catch category
- Reason for discard by catch category or species
- Species composition of discard by catch category

² The buyback program allowed a limited number of permit owners to receive compensation for surrendering their permit and vessel. Due to this program, the number of trawl permits fishing on the coast was reduced by 92.

- Weight of fish retained by catch category
- Species composition of retained by catch category
- Document catch of prohibited species and incidental take of protected species
- Size composition, tags, and viability assessments for Pacific halibut
- Size composition of discarded fish (from randomly selected categories)
- Size composition of retained fish (from randomly selected categories)
- Basic taxonomic composition of non-fish bycatch
- Special biological collections (otoliths, maturity, food habits, genetic samples, etc.)

Data Flow

The eight steps of data processing prior to analysis are detailed below.

1. Data are collected at-sea by the observer following the protocols in the WCGOP Manual (NMFS, NWFSC, 2003, unpublished report).
2. Data are entered into the database system.
 - a. During 2003, WCGOP used a web-based graphical user interface (GUI) to directly enter data into a centralized Oracle database located at the Northwest Fisheries Science Center (NWFSC). Data within the Oracle database are accessible via the web-based GUI or by direct SQL queries to the database. For a list of data tables, see appendix A.
3. Quality Control (QC) of calculations and sampling methods.
 - a. A debriefer or lead observer checks all computations made by the observer and reviews form to ensure that it is complete and that appropriate sampling methods were used.
4. Debriefing
 - a. Observers debrief after every two-month cumulative trip limit period. Debriefing includes:
 - i. Vessel Data - Observers complete a vessel survey for each vessel that explains vessel set-up and basic sampling methodologies.
 - ii. Logbook Review - Observers keep logbooks detailing the events of each trip, basic deck schematics, sampling methods used, communication logs, and confirmation of a current safety decal. Any hauls during which sampling

problems occurred are documented in the logbook and reviewed during debriefing.

iii. Data Correction - Observer corrects all calculations and errors in data forms.

iv. Evaluation - Observers are evaluated on their performance.

5. Data checked and updated in database program.

a. Electronic data is compared to raw data to check for keypunch errors.

Also, all corrections discovered during debriefing are updated in the database program.

6. Quality Control (QC) Queries

a. Queries are run to detect data fall outside specified ranges or other inconsistencies between data elements.

7. Data updated in database system

a. The raw data of all entries that are highlighted by the QC queries are reviewed and the electronic data is updated.

8. Data released to analyst team.

a. At this point, data are considered complete and ready for analysis.

Analysis

Improvements and Changes Made in Analyses and Summary for data collected from September 2002 to August 2003

The first report on the West Coast Groundfish Observer Program (WCGOP) was released in January 2003, entitled “Northwest Fisheries Science Center West Coast Groundfish Observer Program Initial Data Report and Summary Analyses” (it is available at <http://www.nwfsc.noaa.gov/research/divisions/fram/Observer/datareport.cfm>). That report described the analysis of observer data for various species collected during the first year of the program (September 1, 2001 to August 31, 2002). The data analyzed included bottom trawlers using both large and small footropes as well as trawlers using mid-water gear. The report also included any data collected by WCGOP on vessels that participated in trawl gear Experimental Fishing Permits (EFP) authorized by the Pacific Fishery Management Council (PFMC).

During the past year, the WCGOP has solicited valuable comments from readers for statistical and data summary format, which we have incorporated in this year's report.

In this report, we have added summary tables (Tables 4 and 5) that present the data in larger areas and longer time periods than the detailed data presented in Tables 6 and 7. Generally, data from observed EFP trips are excluded from these summary tables, as they are not representative of normal fishing activity, and their results are summarized elsewhere in reports by the sponsoring states. They are included in the evaluation of fleet coverage, however, as EFP trips cannot be reliably excluded from fish ticket records used to document total fleet landings.

The WCGOP report released in January 2003 included an assigned fishing strategy in the stratification of many of the report's tables. The primary reason for doing so was the use of those strategies in the trawl-fleet bycatch model, as configured at that time. Since the bycatch model no longer utilizes these target strategies, data summarization in this report focuses on identifying differences in bycatch associated with area, depth, and time of year. To the extent possible, however, Tables 1 through 7 include details provided in the first report.

In addition, depth intervals throughout this report differ somewhat from those used in the January 2003 report. These changes were made so that the reported depth groupings would correspond more closely with the boundaries of areas used in managing the fishery.

During the past year, the fish ticket data from September 2001 to August 2002 in the PacFIN database have been updated substantially. In addition, the WCGOP has developed additional database data quality rules and queries to automate data quality control. In this report, we not only include data from the program's second year (September 2002 to August 2003), but also update the information from the first year (September 2001 to August 2002).

Continuing Unresolved Analytical Issues

Because observers' recording of retained catch is derived from vessels' hailed weights, accurate calculation of bycatch rates requires linking observer discard estimates to a data base that includes official weights for species determined at the time of landing. The two principal sources of landings data are fish tickets and logbooks that have been adjusted using fish tickets. It remains difficult to

match observer data with fish tickets and the logbooks, due to differences in data protocols among the states of Washington, Oregon, and California, and between the states and the WCGOP.

Each of the states employs different procedures for using fish ticket landings to adjust logbook retained catches (Sampson and Crone, 1997; Pearson and Erwin, 1997; Clark, 1986a, 1986b, 1988a, 1988b). Linking WCGOP records with corresponding logbook haul data is often difficult and time-consuming, due to the inconsistent adjustment protocols, and other factors such as: i) Incomplete logbook submission; ii) A significant number of logbook trips where tows are not recorded in chronological order; iii) The absence of some hauls in logbooks, especially where no groundfish are retained, and; iv) Inaccurate recording of tow locations, depth and date. If these issues were resolved, the analysis of observer data could be more comprehensive and timely.

As a result of these issues, we rely in this report on fish tickets as the source documenting the landed catch for observed trips. The procedures used to adjust haul-level retained haul weights reported by the observers are:

- (i) The retained weights collected by WCGOP are summed across hauls into catch categories for each trip. These catch categories are used, in conjunction with the landing dates in the observer and fish ticket records, to link fishing trips from both data bases.
- (ii) A table is created that links the fish ticket number with the WCGOP trip number. It was not possible to identify the correct links for 11 observed trips from the first year of the program (September 2001 to August 2002) and 25 observed trips from the second year of the program (September 2002 to August 2003). No adjustments to the hailed weights could be made for these trips.
- (iii) The catch categories for the WCGOP data are compared to the fish ticket catch categories.
 - a. For the catch categories that have weights existing in both the WCGOP data and on the fish ticket, the fish ticket catch is used as adjusted catch.
 - b. For the catch categories that exist in the WCGOP data only, the WCGOP catch is used.
 - c. For the catch categories existing on the fish ticket only, the fish ticket weight is used.
- (iv) Trip level adjusted catches are distributed across the hauls.

- a. For the catch categories existing in both the WCGOP data and on the fish tickets, the weight within each observer retained catch category are scaled up or down by the ratio of fish ticket and observer trip weights for that category.
- b. For the catch categories existing in WCGOP only, no adjustment is needed as this data is collected for each haul.
- c. For the catch categories existing on fish tickets only, the trip level fish ticket landings are distributed across hauls according to the proportion of the trip's total retained groundfish hauled weight attributed to each haul.

Since the catch categories on the fish tickets are recorded only at the trip level distributing landed weight across hauls is inevitably imprecise when haul specific observer data is unavailable. This is particularly true when a trip contains hauls from several different depth zones. While the current approach is to distribute these landings in proportion to each haul's percentage of the trip's total retained groundfish, future work will evaluate the incorporation of additional information that may improve these assignments. For catch categories that exist in both fish ticket and WCGOP records, this uncertainty in assigning poundage differences between observed trip retained weights and their corresponding fish tickets is reduced, although not eliminated, by knowledge of the pattern of hauled catches throughout the trip.

Results & Discussion

Overall Coverage Levels

The WCGOP coverage of total groundfish tonnage landed by limited entry trawlers not using mid-water gear averaged 13% from September 2001 to August 2002 (Table 1). This level of coverage exceeded the goal of 10% set for the first year. The second year's goal of increasing trawl coverage was also met, as observed tonnage accounted for 16% of the fleet total.

Spatial Distribution of Observations

In only three of the port groups listed in Table 1 did the percentage of observed landed tonnage decline in the second year of the program: the Neah Bay, San Francisco, and Morro Bay port groups. Collectively, ports in these three groups accounted for just 13% of trawl fleet landings

during the second year of the program. In general, the Puget Sound, Los Angeles and Santa Barbara port groups have received smaller percentages of coverage. Most of the vessels in the Puget Sound port group were involved with EFPs, in which they targeted large volumes of arrowtooth flounder, and were covered by state observers when not selected by the WCGOP. No trawl trips were covered in the two southernmost port groups as most landings made in the Los Angeles and Santa Barbara port groups are made by non-trawl fleets. The trawl tonnage landed in these two ports represented less than 0.3% of the fleet total. The non-trawl fleet information is not summarized in this report.

The number of trips that were observed is summed for each port group is shown in Table 2. The number of trips is by 2-month period, for each year of the program. The data in this table illustrate the highly variable nature of coverage levels. This variability results from seasonal and weather-related impacts on travel activity and differences between vessels in tonnage and species landed.

Plots of starting locations for observed bottom trawls and all bottom trawls recorded in state logbooks are provided in Figures 1a-3b. Figure 1a illustrates haul locations in north of Coos Bay, Oregon, during the first year of the program, while Figure 1b provides the same information for the second year. Most of the fishing grounds between 100-150 fm were closed to bottom trawling throughout most of the second year of observations. The effects of these closures are evident in the clustering of shelf tows between 75-100 fm depth contours between Tillamook and Newport, and in the area just north of Coos Bay (Figure 1b).

The distribution of hauls by depth is listed in Table 3 and plotted in Figure 4. This separation of information by depth shows even more clearly the impact of depth-based closures on the distribution of effort.

Figures 2a and 2b show the first and second year coverage, respectively, for the coastal area between Coos Bay and San Francisco. The combination of a reduction of trips out of ports in the Eureka and Crescent City areas, management's implementation of closed areas and an increase of observers in the area produced much better spatial coverage of fishing sites adjacent to those ports during the second year of the program (Figure 2b). Figures 3a and 3b compare the trawl coverage between the first and second year for the remainder of California south to Santa Barbara. With the

exception of trawl sites from Santa Barbara south, the area of observed tows are similar to vessel activity as recorded in logbooks. Overall, these figures show that there is a high degree of correspondence between the location of observed hauls and overall fleet activity, excluding Santa Barbara. Additionally, during the second year of the program there are fewer pockets of dense trawling activity where observer coverage is absent.

Discard Estimates

Amounts of discarded and retained catches for 23 species or species groups of groundfish are provided in Table 4. This table provides a summary of the information presented in Appendix Tables II and III of the January 2003 report. The data are categorized by area, depth zone, and observer-program year. The table is divided into sub-tables A-W for each species, with overfished species presented first. Table 5 shows the amounts of discarded and retained catches for California halibut, Pacific halibut and combined salmon species. Unlike Appendix Tables II and III of last year's report, Tables 4 and 5 do not include a target strategy dimension (as discussed in the Analysis section), nor do they show results by each 2-month period. Species discard rates are listed on a bi-monthly basis in Table 6.

The effect of depth-based closures are evident in the amounts of catch observed in the 75-150 fathom depth zone during the second year of observation, particularly south of 40°10' N. lat. Observed catch of bocaccio was greater than 11,000 lb during the first year in the southern area between 75 and 100 fathoms. The amount observed in that stratum during the second year was 15 lb. Similar reductions can be seen in this stratum for the other selected species. It should also be noted that the increase in the proportion of bocaccio that were discarded during the second year resulted from a management prohibition on retention of that species. A similar prohibition was in effect for cowcod through both years.

The percentage of catch that was discarded for several target species declined during the second year of observation. For example, during the first year of observation, 17% of the coastwide observed Dover sole catch was discarded. During the second year, the discard rate fell to 10%, in every observed area-depth stratum. The coastwide discard rate for shortspine thornyhead fell from 27% to 18% between years, with similar consistency across all area-depth strata.

Table 5 provides a similar accounting of retained and discarded catch for California halibut, Pacific halibut, and combined salmon species. Though not in the Groundfish FMP, California halibut is a bottom trawl target for some vessels with limited entry permits. Pacific halibut and salmon cannot be retained while fishing with trawl gear.

Due to the difficulties in matching logbook and observer data, ratio estimators for discard are calculated from observer data only. Three different ratio estimators for discard are presented in Table 6 for 29 groundfish and non-groundfish species or species groups. The three estimators are (1) discard per hour towed, (2) discard per pound of retained groundfish, and (3) discard of each species/group per pound of its own catch. Standard errors are also reported for each of these ratios. These results are summarized by area, depth zone, 2-month period, and the observer-program year in which the data were collected.

In many strata, the number of observed tows is very small. Additionally, as illustrated in Figure 5, for each of the overfished species, the vast majority of tows had no discard of the species. For example, in the second year of observations, only 4 out of 566 observed tows south of 40°10' N. lat. encountered any cowcod (Figure 5C). In species, such as lingcod, darklotched rockfish and Pacific ocean perch, nearly all tows had less than 30 pounds of discard. In a few cases (<100 tows), more than 150 lbs. were discarded. These few tows with larger discards accounted for a substantial share of discarded pounds. These factors can result in standard errors for the ratio estimators that are large, relative to the ratios themselves.

For each of eight overfished species, Table 7 reports the ratio estimate (and standard error) of total bycatch (discarded plus retained pounds) per pound of groundfish landed, for each observer-program year, area, depth zone, and 2-month period. The method of calculating these bycatch ratios is very similar to that employed in developing parameters for the trawl bycatch model used by the Council for management of the fishery. These bycatch rates are calculated using total retained groundfish as the denominator. The denominator used to calculate the rates in the bycatch model equals the sum of landed flatfish, thornyheads, sablefish and slope rockfish.

For the most part, the annual average rates at which these species were caught with all groundfish declined between the first and second years of observation. This is particularly true in the shallow and deep depth strata, which constitute the primary areas remaining open to the trawl fleet in 2004.

Due to smaller sizes, the ratios reported in each bi-monthly period are more variable. For lingcod, where the ratios increased between years 1 and 2, the most largest increases occur in less than 150 fathoms. In the southern area and waters less than 75 fathoms, lingcod bycatch was 1.405% of groundfish landed over the first year of observation, and 4.540% during the second year. The ratios in the northern area also increased in this depth stratum, rising from 3.783% to 4.744%. Although both areas also experienced higher bycatch rates for lingcod in the intermediate depth stratum (75-150 fathoms) during the second year of observations, little or no bottom trawling is expected to occur in this depth zone during 2004.

It is important to note that WCGOP only controls the selection of vessels. The activity of the selected vessels can vary in an unpredictable way. Therefore, the program cannot control the percentage of tonnage or trips observed. However, in the future, as patterns in vessel activity emerge, the coverage levels can be more easily controlled.

References

- Clark, W.G. 1986a. Washington's trawl logbook data, past and present. WA. Dep. Fish. prog. Rep, 228, 62p.
- Clark, W.G. 1986b. Standardization of Washington's historical trawl logbook data. WA. Dep. Fish. prog. Rep, 229, 16p.
- Clark, W.G. 1988a. Operation of the coastwide trawl logbook system. WA. Dep. Fish. Manu. Rep, 23p.
- Clark, W.G. 1988b. User's guide to Washington's expanded trawl logbook data. WA. Dep. Fish. prog. Rep, 271, 21p.
- NMFS, NWFSC, West Coast Groundfish Observer Program. 2003. West coast groundfish observer manual, 2002. Northwest Fisheries Science Center, NOAA. (unpublished report)
- Pearson, D.E. and Erwin, B. 1997. Documentation of California's commercial market sampling data entry and expansion programs. NOAA-TM-NMFS-SWFSC-240, 62p.
- Sampson, D.B. and P.R. Crone. 1997. Commercial fisheries data collection procedures for U.S. Pacific coast groundfish. NOAA-TM-NMFS-NWFSC-31, 189p.

Appendix A. Oracle Database

Database Table Hierarchy

TRIPS

- ▶ FISHING_ACTIVITIES
 - ▶ FISHING_LOCATIONS
 - ▶ CATCHES
 - ▶ SPECIES COMPOSITION
 - ▶ SPECIES_COMPOSITION_ITEMS
 - ▶ BIO_SPECIMENS
 - ▶ BIO_SPECIMEN_ITEMS
 - ▶ DISSECTIONS

Database Table Descriptions

The database tables listed in the table below are a subset of the total tables contained in the Oracle database. They represent the tables that are actually used to contain the observer data collected by the WCGOP.

BIO_SPECIMENS	Sets of species physical measurements resulting from sampling catches occurring in a haul or set
BIO_SPECIMEN_ITEMS	Physical measurements collected for an individual fish, mammal or bird occurring in a biological sample
CATCHES	PacFIN catch category based on estimates of fish caught during a haul or set
CATCH_CATEGORIES	PacFIN catch categories
DISSECTIONS	Physical specimens collected for an individual fish, mammal or bird
FISHING_ACTIVITIES	Fishing hauls or sets occurring during a trip
FISHING_LOCATIONS	Locations of hauls or sets
PORTS	Coastal cities where fishing activity is based out of
SPECIES	Fish, mammal and bird species that might be encountered during fishing
SPECIES_COMPOSITIONS	Sets of species weights and counts resulting from sampling catches occurring in a haul or set
SPECIES_COMPOSITIONS_ITEMS	Weights and counts for individual species occurring in a species composition sample
TRIPS	Sets of fishing activities that occur between the time a vessel leaves port and when it returns
VESSELS	Trawl, longline, pot or other fishing vessels